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FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 500.00

Complete if Known	
Application Number	10/622,563
Filing Date	July 18, 2003
First Named Inventor	J. David Greco
Examiner Name	Isam A. Alsomiri
Art Unit	3662
Attorney Docket No.	SPC 0405 NA/40719.766

METHOD OF PAYMENT (check all that apply)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
Application Type	Fee ($)	Small Entity Fee ($)	Fee ($)	Small Entity Fee ($)	Fee ($)	Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims ______ - 20 or HP = **Extra Claims** ______ x **Fee ($)** ______ = **Fee Paid ($)** ______

HP = highest number of total claims paid for, if greater than 20

Indep. Claims ______ - 3 or HP = **Extra Claims** ______ x **Fee ($)** ______ = **Fee Paid ($)** ______

HP = highest number of independent claims paid for, if greater than 3

Multiple Dependent Claims **Fee ($)** ______ **Fee Paid ($)** ______

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets ______ - 100 = **Extra Sheets** ______ / 50 = **Number of each additional 50 or fraction thereof** ______ (round up to a whole number) x **Fee ($)** ______ = **Fee Paid ($)** ______

4. OTHER FEE(S) **Fees Paid ($)**

Non-English Specification, $130 fee (no small entity discount) ______

Other: Appeal Brief 500.00

SUBMITTED BY

Signature	[signature]	Registration No. (Attorney/Agent) 27,262	Telephone (937) 449-6400
Name (Print/Type)	James F. Gottman		Date October 11, 2005

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IFW

BEFORE THE U.S. PATENT AND TRADEMARK OFFICE BOARD OF PATENT APPEALS AND INTERFERENCES

Application of

Applicants	: J. David Greco
Serial No.	: 10/622,563
Filed	: July 18, 2003
Title	: LASER TRANSMITTER WITH THERMALLY INDUCED ERROR COMPENSATION AND METHOD OF TRANSMITTER COMPENSATION
Docket No.	: SPC 0405 NA/40719.766-A1218
Examiner	: Isam A. Alsomiri
Art Unit	: 3662

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on October 11, 2005.

James F. Gottman Reg. No. 27,262

Sir:

APPEAL BRIEF

Applicant appeals from the Final Rejection of claims 1-29, all of the claims pending in the instant application, as more fully set out herein. A Notice of Appeal was timely filed on August 16, 2005. Our check in the amount of $500.00 accompanies this Brief. 37 CFR §1.17(c).

I. Real Party in Interest

The real party in interest in the present appeal is Trimble Navigation Limited of Sunnyvale, California, the assignee of the instant application and of the present application Serial No. 10/042,982, filed January 9, 2002, now U.S. Patent No. 6,621,560, issued September 16, 2003.

II. Related Appeals and Interferences

None

III. Status of Claims

Claims 1, 2, 5-16, 20, 21, 22, and 25-29 stand rejected. Claims 3, 4, 17-19, 23 and 24 stand objected to, having been indicated to be allowable if rewritten in independent form.

IV. Status of Amendments

No amends have been filed subsequent to final rejection.

V. Summary of Claimed Subject Matter

The following is a concise explanation of the subject matter defined in each of the independent claims involved in this appeal.

A. Claim 1

Claim 1 relates to a "transmitter for projecting a beam of laser light" which is shown as transmitter 10 in Fig. 1, and described beginning at page 6, line 21. The laser transmitter 10 includes a base 12, a projection arrangement 14, an input device 15, a positioning device 16, and a processor and temperature correction circuit 19. The transmitter 10 includes a source of laser light 18, which cooperates with an optical assembly 20 and an optical projecting device 22. The projection arrangement 14 also includes one or more level vials, such as level vials 80 and 82, that are coupled to the frame 24, and that sense the angular orientation of the frame.

Fig. 3, discussed at page 13, line 9 et seq, illustrates the operation of one of the level vials, indicated at 100. Vial 100 has leads A, B, and C connected to a vial circuit 120 which monitors the relative values of resistances R_{AC} and R_{BC}, thereby assessing the inclination of the vial 100. Resistances R_{AC} and R_{BC} are shown in Fig. 3 as discrete resistors for simplicity. A temperature sensor for detecting the temperature of the vial includes a current sensor circuit comprising a test resistance R_T and a test circuit, including amplifier 122. Periodically, vial circuit 120 applies a test signal of predetermined voltage and short duration across lines 124 and 126, and therefore across the end electrodes of the level vial 100. The current produced in response to this test voltage is directly proportional to the conductance of the series connected resistances R_{AC}, R_{BC}, and resistor R_T, and is inversely related to the bulk resistivity of the

electrically conductive fluid in the vial 100. The value of resistor R_T is small in comparison to the resistances R_{AC} and R_{BC}. As a consequence, resistor R_T does not significantly affect the operation of the balance of the circuitry. The current through the series connected resistances R_{AC}, R_{BC}, and resistor R_T produced in response to the test voltage is an indication of the temperature of the vial 100, as it has been found that resistances R_{AC} and R_{BC} vary with the temperature of the vial 100. The voltage across resistor R_T provides an indication of this current level. This voltage is amplified by amplifier 122 and an output signal applied to processor and temperature correction circuit 19. Processor 19 controls the operation of the transmitter such that temperature induced errors in the orientation of the beam of laser light are compensated.

B. Claim 16

Claim 16, like claim 1, relates to a "transmitter for projecting a beam of laser light" which is shown as transmitter 10 in Fig. 1, and described beginning at page 6, line 21. The laser transmitter 10 includes a base 12, a projection arrangement 14, an input device 15, a positioning device 16, and a processor and temperature correction circuit 19. The transmitter 10 includes a source of laser light 18, which cooperates with an optical assembly 20 and an optical projecting device 22. The projection arrangement 14 also includes one or more level vials, such as level vials 80 and 82, that are coupled to the frame 24, and that sense the angular orientation of the frame.

The construction of each of the level vials is shown in Figs. 2A, 2B, and 2C, and described on page 11, lines 11 et seq. Each of the level vials has a an electrically nonconductive vial casing 102 defining an elongated chamber 104. The casing 102 curves generally downward toward opposite ends 107 and 108. A quantity of electrically conductive fluid 110 is provided in the chamber 104, along with an air bubble 118. A pair of end electrodes 112 and 114 electrically communicate with the upper portions of the chamber adjacent opposite ends 108 and 107, respectively, and extend toward the central portion of the chamber 104. A common electrode 116 electrically communicates with the lower portion of the chamber 104. Electrodes 112, 114, and 116 are electrically connected to electrical leads, labeled A, B, and C, respectively, which extend through the casing 102.

Fig. 4, the description of which begins on page 14, shows a circuit arrangement for first and second level vials 200 and 202 for detecting errors in reading the levels vials based upon the temperatures of the vials themselves. The circuit 220 includes a vial drive circuit 233, level amplifiers 237, current sense resistor R_T and coupling capacitors. Outputs 227 and 229 are connected to the common electrode C of the vials 202 and 200, respectively, and kept separate. The voltages at the A leads of vials 202 and 200 are substantially equal to each other as are the voltages at the B leads of the two vials. Furthermore the voltage at the A leads is substantially opposite with respect to the system ground voltage compared to the voltage at the B leads. When R_{AC} equals R_{BC}, the voltage at the C lead will be substantially equal to the system ground voltage. Signals on 227 and 229 are amplified to five indications for each X axis and Y axis level errors.

Vial drive circuitry provides current at 225 and 228 such that the voltage between 224 and 226 is a predetermined level. Currents on 224, 226, 227, and 228 are kept to substantially zero, so that substantially all of the current that flows through the parallel combination of vials also flows through current sense resistor, R_T. Amplifier 222 measures the voltage across R_T and provides that signal to the processor as an indication of current through the vials. This signal is also an indication of the bulk conductance of the two vials, which is an indication of the bulk conductance of the electrolyte in the vials and the size of the bubble and, finally, an indication of the temperature of the vials.

C. Claim 20

Claim 20, like claims 1 and 16, relates to a "transmitter for projecting a beam of laser light" which is shown as transmitter 10 in Fig. 1, and described beginning at page 6, line 21. The laser transmitter 10 includes a base 12, a projection arrangement 14, an input device 15, a positioning device 16, and a processor and temperature correction circuit 19. The transmitter 10 includes a source of laser light 18, which cooperates with an optical assembly 20 and an optical projecting device 22. The projection arrangement 14 also includes one or more level vials, such

as level vials 80 and 82, that are coupled to the frame 24, and that sense the angular orientation of the frame.

Fig. 3, discussed at page 13, line 9 et seq, shows a a temperature sensor for detecting the temperature of the vials including a current sensor circuit comprising a test resistance R_T and a test circuit, including amplifier 122. Periodically, vial circuit 120 applies a test signal of predetermined voltage and short duration across lines 124 and 126, and therefore across the end electrodes of the level vial 100. The current produced in response to this test voltage is directly proportional to the conductance of the series connected resistances R_{AC}, R_{BC}, and resistor R_T, and is inversely related to the bulk resistivity of the electrically conductive fluid in the vial 100. The value of resistor R_T is small in comparison to the resistances R_{AC} and R_{BC}. As a consequence, resistor R_T does not significantly affect the operation of the balance of the circuitry. The current through the series connected resistances R_{AC}, R_{BC}, and resistor R_T produced in response to the test voltage is an indication of the temperature of the vial 100, as it has been found that resistances R_{AC} and R_{BC} vary with the temperature of the vial 100. The voltage across resistor R_T provides an indication of this current level. This voltage is amplified by amplifier 122 and an output signal applied to processor and temperature correction circuit 19. Processor 19 controls the operation of the transmitter such that temperature induced errors in the orientation of the beam of laser light are compensated.

VI. Grounds of Rejection to be Reviewed on Appeal

Claims 1, 2, 5, 11 - 16, 20, 21, 22, and 25 - 29 have all been finally rejected under 35 U.S.C. §103 as unpatentable over Gerard et al U.S. Pat. No. 5,689,330 in view of Lopes et al U.S. Pat. No. 4,779,353. Claim 6 has been finally rejected under 35 U.S.C. §103 as unpatentable over Gerard et al U.S. Pat. No. 5,689,330 in view of Lopes et al U.S. Pat. No. 4,779,353 and Ito U.S. Pat. No. 5,146,688. Although the Office Action of April 26, 2005 in the Detailed Action section did not mention claims 7, 8, 9, or 10 specifically (the Office Action Summary does indicate that these claims are rejected); it is assumed that these claims are finally rejected under 35 U.S.C. §103 as unpatentable over Gerard et al U.S. Pat. No. 5,689,330 in view of Lopes et al

U.S. Pat. No. 4,779,353, since this is the basis of the rejection of claim 5; the claim from which claims 7 - 10 depend, either directly or ultimately.

VII. Argument

A. The rejection of claims 1, 2, 5, 7 - 16, 20, 21, 22, and 25 - 29 under 35 U.S.C. §103 as unpatentable over Gerard et al U.S. Pat. No. 5,689,330 in view of Lopes et al U.S. Pat. No. 4,779,353.

1. Claims 1,2, 5, 11 - 16 and 25 - 29.

The Gerard patent is the primary reference relied upon in the rejection of claims 1, 2, 5, 11 - 16, and 25 - 29. These claims are distinguishable from the Gerard patent, because they call for "detecting the temperature of said level vial itself." The apparatus disclosed in the Gerard reference, on the other hand, uses a thermister 40 (Fig. 2) positioned next to the inclinometer 24 to detect the temperature of the inclinometer 24. In Gerard, the temperature of the thermister is directly measured, and it is then assumed that the temperatures of the thermister and the inclinometer are same. Claims 1, 2, 5, 11 - 16, and 25 - 29 are distinguishable from the Gerard reference in that the these claims recite measuring the temperature of the inclinometer directly. This is done by measuring the electrical resistivity of the fluid in the inclinometer. In contrast, the Gerard patent teaches using a thermister in close physical contact with the outer surface of the inclinometer to measure temperature. Gerard actually directly measures the temperature of the thermister, and assumes that the thermister and the inclinometer are in sufficient thermal communication that their temperatures will be the same.

The Examiner acknowledges this deficiency; He goes on to say: "However, detecting the temperature of the vial directly is well known. Lopes teaches a level vial which the temperature is measured directly through a connection to the level wires 35, 25, 30" (see column 13, lines 23-28). The Examiner asserts that it would have been obvious to modify Gerard to measure the temperature of the vial itself "for more accurate measurement of the level vial to generate a more accurate compensation signal."

A careful review of the Lopes patent, however, reveals that the inclinometer of Lopes differs significantly from the inclinometer of Gerard, and that it would not have been obvious to combine the teachings in the way suggested by the Examiner. The Lopes system uses an inclinometer which measures the resistance of several, generally vertical resistance wires having their lower portions shorted out by an electrically conductive fluid and their upper portions in an electrically non-conductive fluid. As the inclinometer is tilted, the resistances of the wires will change, since the electrically conductive fluid will short out varying lengths of the resistance wires. An increased resistance in a wire indicates that a greater expanse of that wire is not shorted out by the conductive fluid, while a reduced resistance indicates that a lesser expanse of the wire is not shorted out by the conductive fluid. The Lopes inclinometer has an extra resistance wire to provide an indication of changes that result from temperature effects and from "changes in the electronic measuring system" (see column 8, lines 16, 17). The electrical resistance of this extra resistance wire, positioned down the middle of the inclinometer or just in the upper, electrically non-conductive fluid, is measured and used as a standard. Since the length of the portion of this extra wire not shorted out by the conductive fluid remains constant, even though the inclinometer changes orientation, fluctuation in resistance of this extra wire provides an indication of the temperature of this extra wire.

The Gerard reference, on the other hand, shows a circuit (Fig. 2) that applies a square wave signal across leads 32a, 32b of inclinometer 24. An output signal from electrode 28 is a function of the direction and degree of tilt of inclinometer 24, and is used in the control of a laser transmitter.

It would not be possible to substitute the inclinometer of Lopes for that of Gerard, and produce a working system. Further it would not be possible to add a resistance wire from the Lopes inclinometer to the inclinometer of Gerard. Neither approach would produce a workable device, and this inability to combine the inclinometers makes clear that it would not be obvious to do so. Therefore, it is simply not obvious to combine the teachings of these two references in a way that results in an inoperative system.

The two inclinometers operate in completely different manners, and are not interchangeable. In Gerard, "Inclinometer 24 includes first and second spaced apart input

electrodes 26 and an output electrode 28. An inclinometer drive circuit 30 applies a square wave signal across leads 32a, 32b connected with electrodes 26. An output signal taken from output electrode 28, which is a function of the direction and degree of tilt of inclinometer 24, is provided as an input to an inclination summer and amplifier circuit 34." The measured resistance paths are apparently through the conductive fluid in the inclinometer, from the electrodes 26 to the electrode 28. See, column 1, lines 30 - 33, where it is stated in relation to the prior art: "The resistance of a conductive fluid in a vial in each inclinometer sensor is utilized to operate servo motors in order to drive the orientation of the beam until the inclinometer indicates a level orientation." Apparently the inclinometer 24 is of this type. A resistive wire simply would not work in such an inclinometer to indicate temperature.

Further, it would not be possible to measure wire resistance as a way of detecting the temperature of the inclinometer of Gerard. The electrically conductive fluid of the Gerard inclinometer would short out a thermal sensing resistance wire, if such a wire were inserted in the vial of the Gerard inclinometer.

Finally, the motivation cited by the Examiner to combine Gerard and Lopes is clearly without support in the references, or otherwise. The Examiner indicates that this combination would be suggested by the need for more accurate measurements. There is nothing in the references, or otherwise, which suggests that the device of Gerard not sufficiently accurate; nor that the Gerard use of an extra resistance wire is of greater accuracy.

2. Claims 7 - 10

Claims 7 - 10 depend either directly or ultimately from claim 5 and are patentable over the cited prior art for the same reasons given above in regard to claim 5. Additionally, it is submitted that even if the Gerard and Lobes references were properly combinable, the resulting combination would not meet the terms of claims 7 - 10. Claim 7 specifies that "said temperature sensor circuit comprises a test circuit coupled to said first, second and common leads of said level vial, said test circuit configured to provide a test signal to said level vial and monitor said first and second resistances, said first and second resistances corresponding to the temperature of said level vial." The substitution of the inclinometer of Lopes in the device of Gerard would not result in a system in which the first, second and common leads would be monitored to determine

temperature. Claim 8 calls for a short duration test signal. Claim 9 calls for a sensor circuit that has "a test resistance in series with said first lead of said level vial, wherein the temperature of said level vial is determined based upon a current passing through said test resistance in response to said test signal." Claim 10 calls "measuring the voltage across said test resistance in response to said test signal, and computing said current." None of these elements would be found in a system that might result from the combination of the teachings of Gerard with those of Lopes.

3. Claims 20, 21, and 22.

Claims 20, 21, and 22 are patentable over the combination of the Gerard and Lopes references for the same reasons presented above in regard to claim 1.

a. Additionally, claim 20 calls for "a temperature sensor circuit for detecting the resistance of said quantity of fluid in said level vial, said resistance being related to the temperature of said level vial." Such an element is to be found in neither Gerard nor Lopes. Gerard determines the temperature of an inclinometer by measuring the temperature of a thermister and assuming that the temperature of the inclinometer is the same as that of the thermister. Lopes measures the temperature of the vial by measuring the resistance of a resistive wire in the inclinometer - not by measuring the resistance of the fluid in the inclinometer through the same leads that are used to measure inclination.

b. Additionally, claim 21 calls for "a test resistance in series with said conductive fluid," "a source configured to provide a test signal between said test resistance and said conductive fluid in said level vial," and "a detector for detecting the voltage across said test resistance, wherein the temperature of said level vial is determined by a computation of the current through said test resistance based upon the voltage across said test resistance, and a correlation of the computed current to a temperature." There is simply no teaching of these elements in either Gerard or Lopes.

c. Additionally, claim 22 calls for the application of a periodic, short duration test signal. There is simply no teaching of this in either Gerard or Lopes.

B. The rejection of claim 6 under 35 U.S.C. §103 as unpatentable over Gerard et al U.S. Pat. No. 5,689,330 in view of Lopes et al U.S. Pat. No. 4,779,353 and Ito U.S. Pat. No. 5,146,688

Claim 6 depends from claim 5 and is patentable over the cited prior art references (Gerard and Lopes) for the same reasons given above in regard to claim 5. The citation to Ito does nothing to cure the defects pointed out above.

CONCLUSION

For the reasons presented above, it is submitted that the claims on appeal are allowable and that the final rejection of these claims by the Examiner should be reversed.

Respectfully submitted,

DINSMORE & SHOHL LLP

By ______________________
James F. Gottman
Registration No. 27,262

One Dayton Centre
One South Main Street, Suite 1300
Dayton, Ohio 45402-2023
Telephone: (937) 449-6403
Facsimile: (937) 449-6405

VIII. CLAIMS APPENDIX

1. A transmitter for projecting a beam of laser light, comprising:

a source of laser light;

a projection arrangement for directing the laser light from said transmitter, said projection arrangement including a level vial;

a temperature sensor circuit for detecting error induced by temperature change where said error is a function of vial temperature, by detecting the temperature of said level vial itself; and

a temperature correction circuit, responsive to said temperature sensor circuit, that adjusts said projection arrangement to compensate the direction of the laser light as a result of said error detected by said temperature sensor circuit.

2. The transmitter according to claim 1, wherein said temperature sensor circuit performs a measurement on said level vial related to the temperature thereof.

3. The transmitter according to claim 1, wherein said level vial has a vial casing, and said temperature sensor circuit is configured to detect errors caused by distortion in the shape of said vial casing due to temperature change.

4. The transmitter according to claim 3, wherein said temperature sensor circuit is configured to detect asymmetrical distortion in the shape of said vial casing due to temperature change.

5. The transmitter according to claim 1, wherein said level vial has a first lead, a second lead, and a common lead, wherein inclination of said level vial is detected by monitoring a first resistance between said first lead and said common lead, and a second resistance between said second lead and said common lead.

6. The transmitter according to claim 5, wherein said level vial contains a quantity of electrically conductive fluid therein, said electrically conductive fluid defining said first and second resistances.

7. The transmitter according to claim 5, wherein said temperature sensor circuit comprises a test circuit coupled to said first, second and common leads of said level vial, said test circuit configured to provide a test signal to said level vial and monitor said first and second resistances, said first and second resistances corresponding to the temperature of said level vial.

8. The transmitter according to claim 7, wherein said test signal is provided as a signal having a predetermined voltage and short duration.

9. The transmitter according to claim 7, wherein said temperature sensor circuit further comprises a test resistance in series with said first lead of said level vial, wherein the temperature of said level vial is determined based upon a current passing through said test resistance in response to said test signal.

10. The transmitter according to claim 9, wherein said current is determined by measuring the voltage across said test resistance in response to said test signal, and computing said current.

11. The transmitter according to claim 1, further comprising a processor that provides the compensation to said temperature correction circuit using an offset grade value.

12. The transmitter according to claim 11, further comprising a lookup table accessible by said processor that stores a plurality of offset grade values and associated temperatures.

13. The transmitter according to claim 12, wherein said plurality of offset grade values comprises at least three offset grade values and corresponding predetermined temperature ranges.

14. The transmitter according to claim 12, wherein said processor calculates grade offset by applying a measured vial temperature to an interpolation of grade offsets and corresponding vial temperatures in said lookup table.

15. The transmitter according to claim 12, wherein said offset grade values are unique to a specific transmitter and level vial incorporated therein.

16. A transmitter for projecting a beam of laser light, comprising:

a source of laser light;

a projection arrangement for directing the laser light from said transmitter, said projection arrangement including first and second level vials, each of said first and second level vials having:

a vial casing;

a first lead;

a second lead; and

a common lead, wherein inclination is detected by monitoring a first resistance between said first lead and said common lead, and a second resistance between said second lead and said common lead;

a temperature sensor circuit, connected to said first, second, and common leads of said first and second level vials, for detecting errors in reading said first and second level vial based upon the temperature of said first and second level vials themselves; and

a temperature correction circuit, responsive to said temperature sensor circuit, that adjusts said projection arrangement to compensate the direction of the laser light as a result of said errors detected by said temperature sensor circuit.

17. The transmitter according to claim 16, wherein said temperature sensor circuit comprises:

a level amplifier coupled to said common lead of both said first and second level vials;

a test resistance in series with a parallel combination of said first lead of both of said first and second level vials;

a drive circuit coupled to said test resistance and said second lead of both said first and second level vials; and

a current sensing amplifier across said test resistance.

18. The transmitter according to claim 17, wherein said drive device provides a first voltage applied to said first leads of said first and second level vials that is generally equal in magnitude, and opposite in polarity to a second voltage applied to said second leads of said first and second level vials.

19. The transmitter according to claim 17, wherein an output of said current sensing amplifier is provided to a processor as an indication the current through said first and second level vials where the current represents an indication of the temperature of the first and second level vials.

20. A transmitter for projecting a beam of laser light, comprising:

a source of laser light;

a projection arrangement for directing the laser light from said transmitter, said projection arrangement including a level vial having a quantity of fluid therein;

a temperature sensor circuit for detecting the resistance of said quantity of fluid in said level vial, said resistance being related to the temperature of said level vial; and

a temperature correction circuit, responsive to said temperature sensor circuit, for adjusting said projection arrangement to compensate for errors in the direction of the laser light as a result of temperature induced variation in said level vial.

21. The transmitter according to claim 20, wherein:

said temperature sensor circuit comprises:

a test resistance in series with said conductive fluid in said level vial;

a source configured to provide a test signal between said test resistance and said conductive fluid in said level vial; and

a detector for detecting the voltage across said test resistance, wherein the temperature of said level vial is determined by a computation of the current through said test resistance based upon the voltage across said test resistance, and a correlation of the computed current to a temperature.

22. The transmitter according to claim 21, wherein said test signal is applied periodically and is of a predetermined voltage and short duration.

23. The transmitter according to claim 20, wherein the resistance of said electrically conductive fluid that is detected by said temperature sensor circuit characterizes distortion in the shape of a vial casing of said level vial as a result of temperature.

24. The transmitter according to claim 23, wherein the distortion in said vial casing is asymmetrical.

25. The transmitter according to claim 20, further comprising a processor that provides the compensation to said temperature correction circuit using an offset grade value.

26. The transmitter according to claim 25, further comprising a lookup table accessible by said processor that stores a plurality of offset grade values and associated temperatures.

27. The transmitter according to claim 26, wherein said plurality of offset grade values comprises at least three offset grade values and corresponding predetermined temperature ranges.

28. The transmitter according to claim 26, wherein said processor calculates grade offset by applying a measured vial temperature to an interpolation of grade offsets and corresponding vial temperatures in said lookup table.

29. The transmitter according to claim 26, wherein said offset grade values are unique to a specific transmitter and level vial incorporated therein.

IX. EVIDENCE APPENDIX

NONE.

X. RELATED PROCEEDINGS APPENDIX

NONE.